Coding Stage: Main Principles

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https://create.kahoot.it/share/intro-tnm-ljubljana/75603ea1-6d45-471f-940e-1ac7c9fe8a25

Overview

PART I

- Definition, importance, history and objectives TNM
- TNM: general principles

PART II

- Paediatric tumours

3 essential factors in the management of cancer

Site

- Site of origin of the cancer
- E.g. breast, prostate, …

Characteristics

- Histologic/biologic characteristics
- E.g. Grade Group in prostate adenocarcinoma, HER2/neu positive breast adenocarcinoma

Extent

- Anatomical extent of the cancer or '**STAGE'**
- E.g. Stage (I, II, III, IV)

Stage: definition and importance

- '**To stage**' versus '**the stage**'
  - The verb: To stage a patient, e.g. diagnostic workup before treatment
  - The noun: e.g. this is a stage III disease
- Important for the Patient
  - Treatment, Prognosis, Clinical Research
- Important for Cancer Control Activities
  - Public health (added in the **7**th edition)
  - Oncology

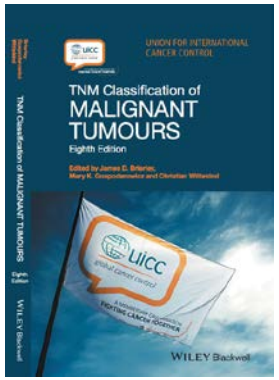
TNM classification

- The most extensive staging system that exists
- Used all over the world by clinicians and epidemiologists
- Comparability of data
- Changes over time in order to incorporate new developments

- Whose responsibility?
  - Physician who disposes of the most complete information (clin/path.)

History TNM

- **1943-1952 TNM** developed by Pierre Denoix (France)
- 1968 International Union Against Cancer (UICC): TNM classification of Malignant Tumours
- 1969 UICC TNM General rules
- **1974 UICC TNM Classification of Malignant Tumours, 2nd edition**
- **1978 UICC TNM Classification of Malignant Tumours, 3rd edition**
- 1982 UICC TNM Classification of Malignant Tumours, revised 3rd edition
- **1987 UICC TNM Classification of Malignant Tumours, 4th edition**
- 1992 UICC TNM Classification of Malignant Tumours, revised 4th edition
- **1997 UICC TNM Classification of Malignant Tumours, 5th edition**
- **2002 UICC TNM Classification of Malignant Tumours, 6th edition**
- **2009 UICC TNM Classification of Malignant Tumours, 7th edition**
- *2016 UICC TNM Classification of Malignant Tumours, 8th edition* ***(effective as from 2017)***
  - ***Some registries as from 2018 (e.g. US)***

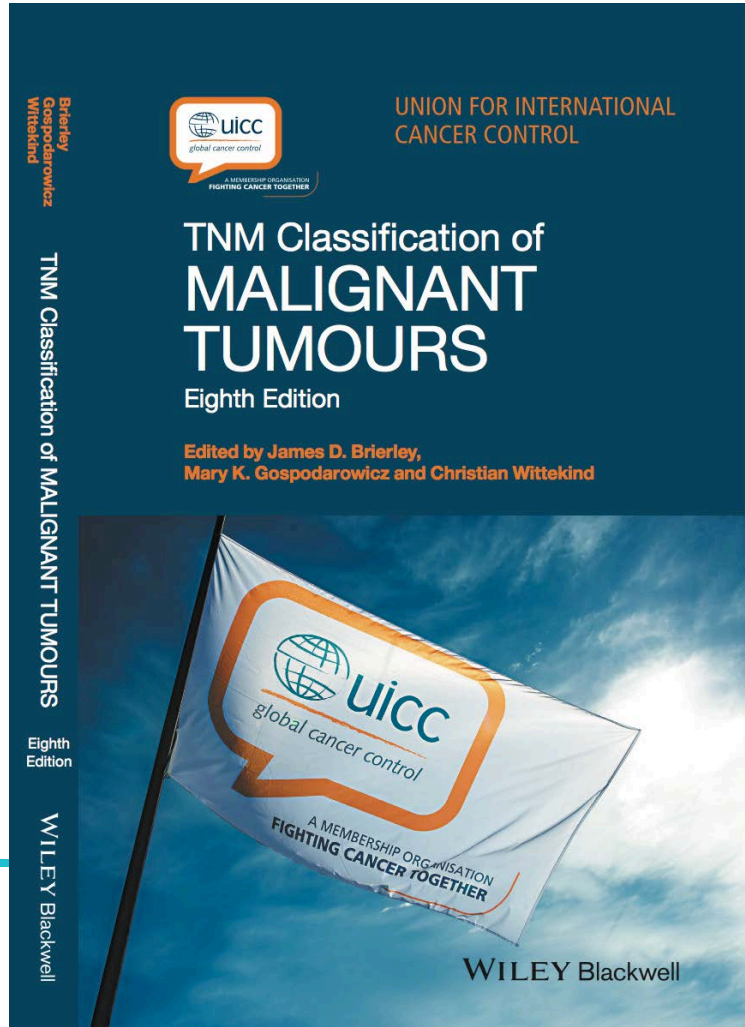


Global harmonization of cancer staging classification through close collaboration with stakeholders:
WHO, IARC, IACR, IALSC, AJCC, FIGO, CDC, ICCR, NCI

“How much of it is there?” TNM classification

- Cancer stage is the **ANATOMIC EXTENT OF DISEASE**
- **Classification using T, N and M-categories**

- **Summarised as Stage (typically I, II, III, IV)**



TNM: general principles (1)

T-category : **TUMOUR**
describes the extent of the primary tumour
Ta, Tis, T0, T1, T2, T3, T4, Tx

N-category : **NODE**
describes the absence or presence and extent of regional lymph node metastasis
N0, N1, N2, N3, Nx

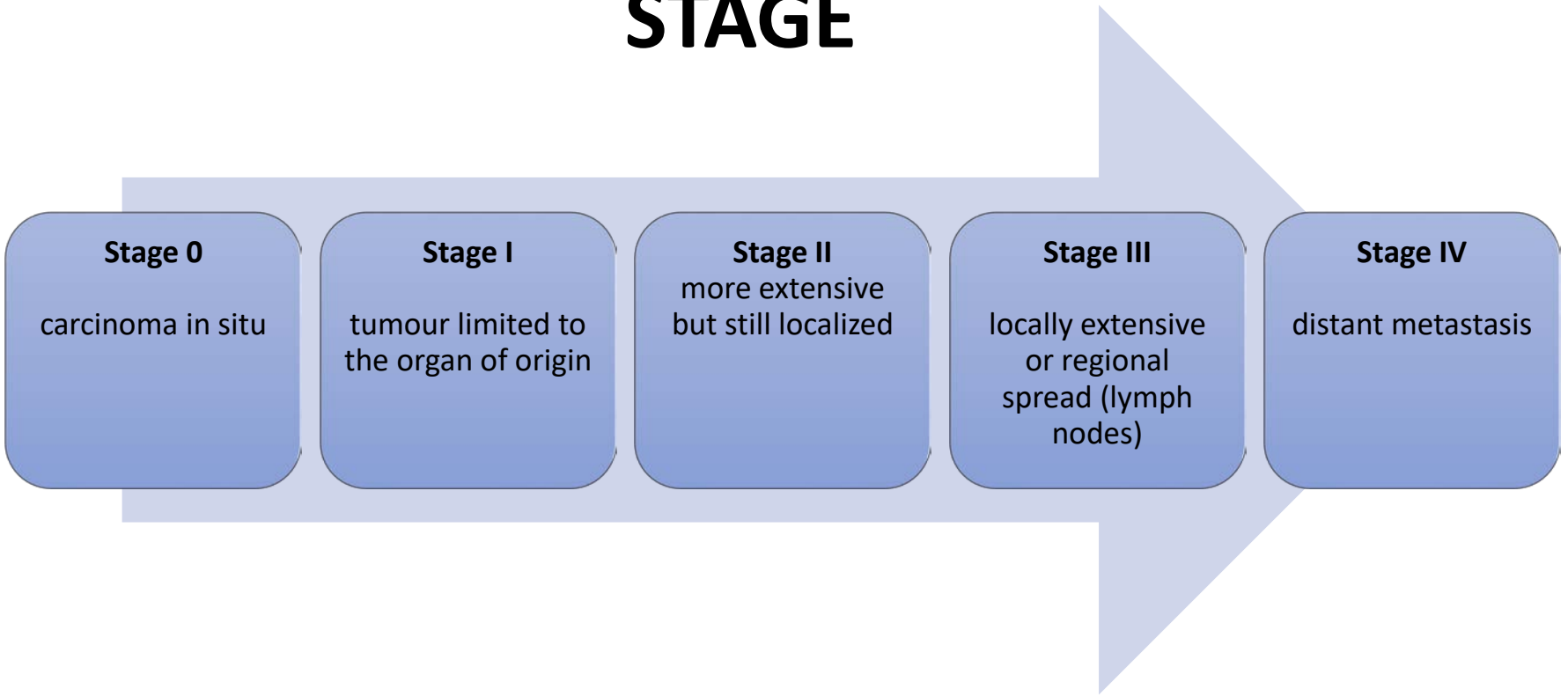
M-category : Metastasis
describes the absence or presence of distant metastasis
M0, M1, ~~Mx~~

Summarised as 'STAGE' (typically I, II, III, IV)

e.g. kidney cancer
cT1 N0 M0 = Stage I

The General Rules of the TNM system: Stages

STAGE

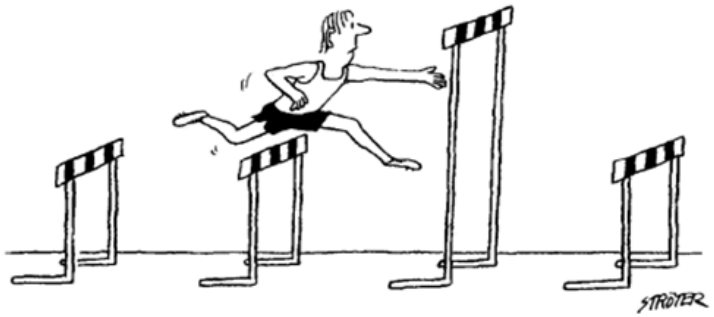


+ prognostic factors: 'PROGNOSTIC GROUP'

ENCR-JRC DATA call (2015): questionnaire

- 72% of the Cancer Registries collect ‘information about stage’

- 46% of the general CRs submitted data related to the extent of the disease (mostly TNM)



TNM classification

- TNM classification depends on, and is specific for...
  - primary tumour localization (topography) and histology (morphology)

    E.g. TNM for Stomach cancer – carcinoma
    TNM for GIST of the stomach
    Non-Hodgkin lymphoma of the stomach

- TNM not available for all tumours
  - E.g. Brain tumours: no TNM available

- TNM ‘under construction’ => testing => see TNM Supplement 5th ed.

UICC, TNM 8th edition, 2016

Contents

European Network of Cancer Registries

The General Rules of the TNM System: cTNM - pTNM

cTNM

Clinical classification

Designated **BEFORE** treatment

To select and evaluate therapy

pTNM

Pathological classification

Designated **AFTER** surgery

To guide adjuvant therapy, estimate prognosis and calculate end results

ypTNM

Pathological evaluation after neo-adjuvant therapy

(Designated AFTER surgery)

To guide adjuvant therapy, estimate prognosis and calculate end results

Additional descriptor: prefix ‘y’

In those cases in which classification is performed during or following neo-adjuvant, the cTNM or pTNM category is identified by a **y** prefix.

The **y**cTNM or **y**pTNM categorizes the extent of tumour actually present at the time of that examination.

Example:

ycTNM: **clinical** evaluation after neo-adjuvant chemoradiotherapy for rectal cancer

ypTNM: **pathological** evaluation after neo-adjuvant chemoradiotherapy for rectal cancer

The General rules of the TNM system: cTNM

- Clinical classification is based on any information gathered about the extent of cancer from the time of diagnosis until the initiation of primary treatment **or** decision not to treat

- Possible information that can be used:
  - clinical history and symptoms,
  - physical examination,
  - imaging,
  - endoscopy or surgical exploration without resection,
  - biopsy of primary site, biopsy of a single regional node, biopsy of a distant metastatic site

=> precision
=> must remain unchanged after establishment!

How to assign T, N, M? how to start…?

- Determine *primary site* and *histology*
- Look up site *chapter*
- Is the *histology included* in this chapter?
- Review *list of regional lymph nodes*
- Clinical *versus* pathologic stage *versus* ycTNM/ypTNM
- Find staging information in the tables
- Determine T, N, M with the medical record data (medical reports)
- (Assign stage on the basis of the T, N and M)

The General Rules of the TNM System: cT category

- **cTX** Primary tumour cannot be assessed =>to be avoided
- **cT0** No evidence of primary tumour
  - E.g. occult breast carcinoma
- **cTis** Carcinoma in situ - epithelial tumours
- **cTa** Non-invasive papillary carcinoma
  Bladder, renal pelvis, ureter, urethra, Penis

- **cT1-T4** Invasive tumours
  Increasing size and/or depth/local extent of the primary tumour

T-category: different criteria for different cancers

MOSTLY T1-T4 (exception: ovary, vulva T1-T3)
- Subcategories T1a, T1b, etc. are often used

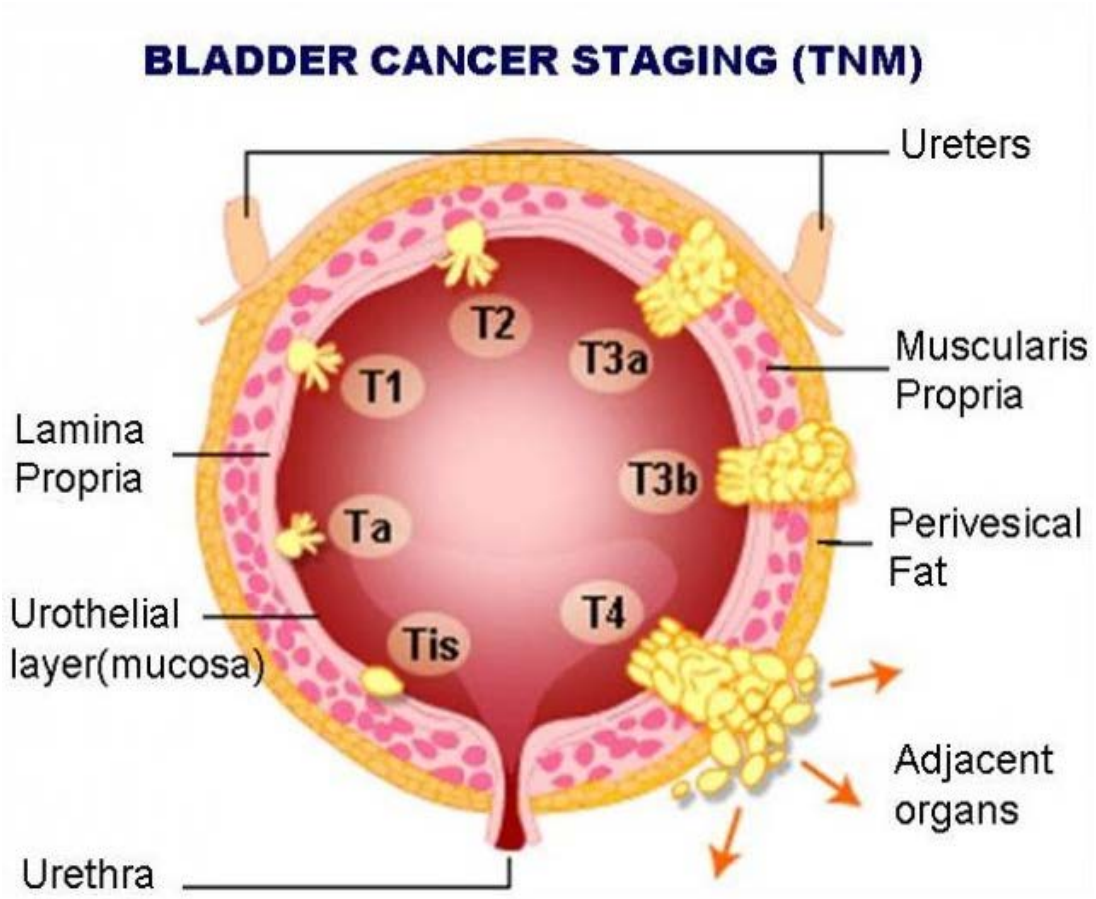
BASED on
- Tumor **size**
  - Breast, parotid gland, oral cavity
- **Depth** of invasion through wall of organ
  - Colon, bladder, melanoma
- Location and **extension**
  - Lung, larynx, pancreas
- Other factors
  - Tumour multiplicity (liver)
  - Combination

T-values: size (only)

- Example: **Gastrointestinal Stromal Tumour (GIST)**
  - **T1** ≤ 2 cm
  - **T2** >2 cm, ≤ 5 cm
  - **T3** >5 cm, ≤ 10 cm
  - **T4** >10 cm

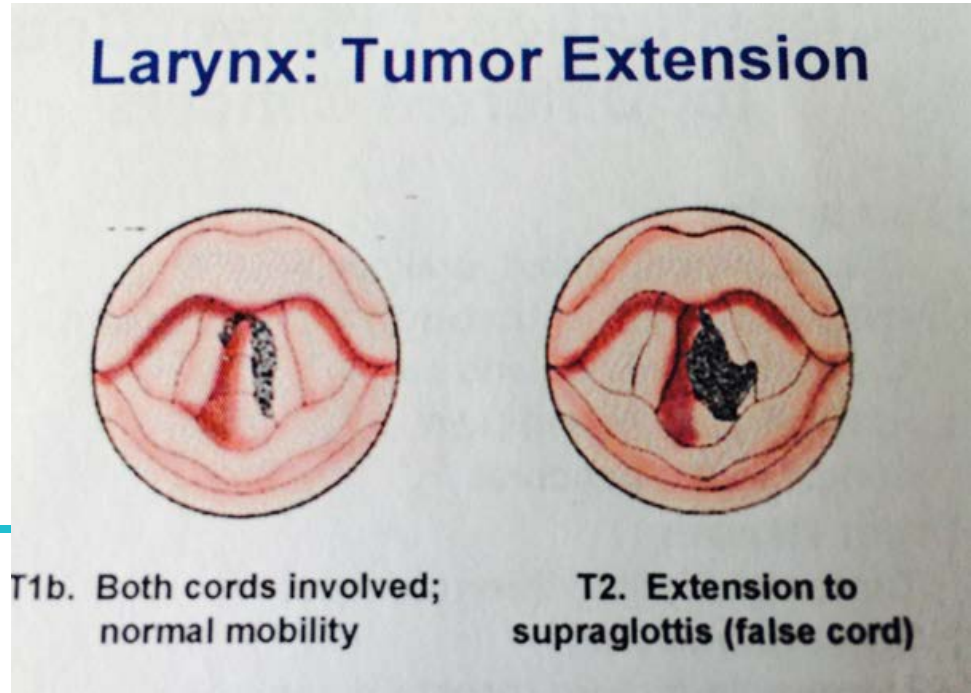
T-category: depth of invasion

- Example: **Bladder**
  - **T1** subepithelial connective tissue
  - **T2** muscularis propria
  - **T3** perivesical tissue
  - **T4** beyond bladder



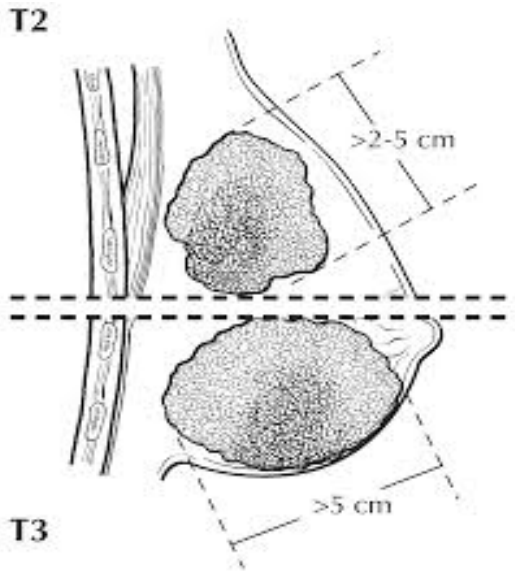
T-categories: extension

- Example: **Larynx (glottis)**
  - **T1** One T1a/both vocal cords T1b, normal mobility
  - **T2** Extension to supraglottis/subglottis, impaired cord mobility
  - **T3** Confined to larynx with vocal cord fixation
  - **T4a** Moderately advanced local disease
  - **T4b** Very advanced local disease



T-category values: size and extension

- Example: **Breast**
  - **T1** ≤ 2 cm
  - **T2** >2 cm, ≤ 5 cm
  - **T3** >5 cm
  - T4 involving chest wall and/or skin



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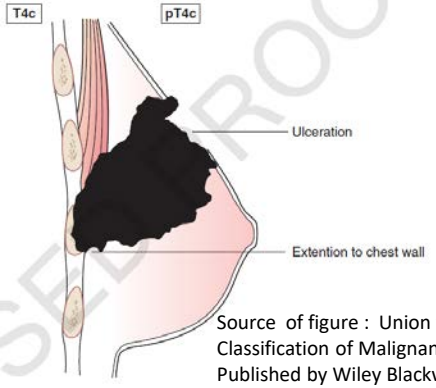

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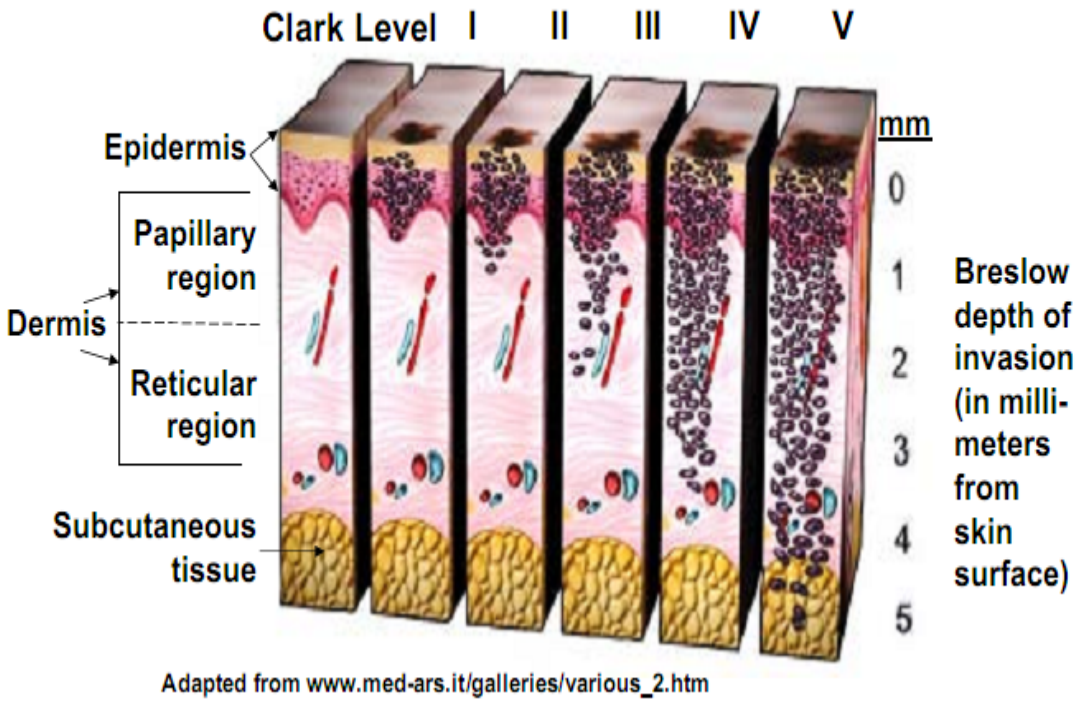
T-category values: cT and pT

- pT categories correspond to the cT categories

- Special cases or exceptions:
  - Melanoma: no cT category but only pT categories: extent of tumour after excision
  - Testis: pT after orchiectomy (except pTis and pT4), there are no cT categories
  - Oropharynx: different T-categories p16+/HPV+ versus p16-/HPV- (or no result)
  - Prostate: no pT1 category – no pT2 **sub**categories

Melanoma: 'thickness': only pT possible!

- **Clark Level and Breslow Depth of Invasion**



Adapted from www.med-ars.it/galleries/various_2.htm

pTX: primary tumour cannot be assessed
pT0: no evidence of primary tumour
pTis: melanoma in situ
pT1: tumour 1.0 mm or less in thickness
pT2: tumour >1 mm but not more than 2 mm in thickness
pT3: tumour > 2mm but not more than 4 mm in thickness
pT4: tumour > 4 mm in thickness

With or without ulceration:
pT1a less than 0.8mm in thickness without ulceration
pT1b less than 0.8 mm in thickness with ulceration or 0.8 mm or more but no more than 1 mm in thickness, w/o ulceration

pT2a without ulceration
pT2b with ulceration
Etc....

No cT categories for skin melanoma!

Prostate cancer: cT and pT categories

T – Primary Tumour

TX Primary tumour cannot be assessed
T0 No evidence of primary tumour

T1 Clinically inapparent tumour that is not palpable
- T1a Tumour incidental histological finding in 5% or less of tissue resected
- T1b Tumour incidental histological finding in more than 5% of tissue resected
- T1c Tumour identified by needle biopsy (e.g., because of elevated PSA)

T2 Tumour that is palpable and confined within prostate
- T2a Tumour involves one half of one lobe or less
- T2b Tumour involves more than half of one lobe, but not both lobes

T3 Tumour extends through the prostatic capsule*
- T3a Extraprostatic extension (unilateral or bilateral) including microscopic bladder neck involvement
- T3b Tumour invades seminal vesicle(s)

T4 Tumour is fixed or invades adjacent structures other than seminal vesicles: external sphincter, rectum, levator muscles, and/or pelvic wall

pT

- **No pT1** because insufficient tissue to assess the highest pT category
- No subcategories for pT2

The General Rules of the TNM System: T-category and additional descriptor ‘m’

The suffix **m** is used to indicate the presence of multiple primary tumours at a single site. This can also be indicated by the number of primary tumours

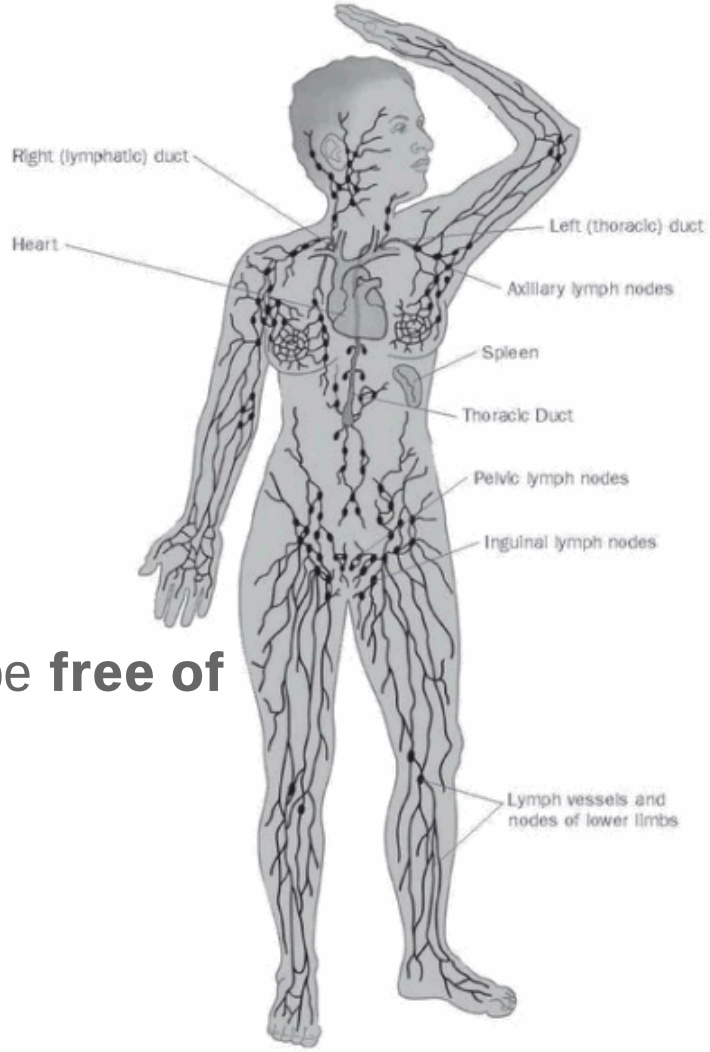
Example:

- Thyroid: T2(m)
- Breast: T1c(m) or T1c (3)
  - What if invasive and in situ component? Only take the dimension of the invasive component

N-category

N: Regional lymph nodes - Lymph node involvement

- Absence or presence of metastases in primary lymph node drainage area of a cancer



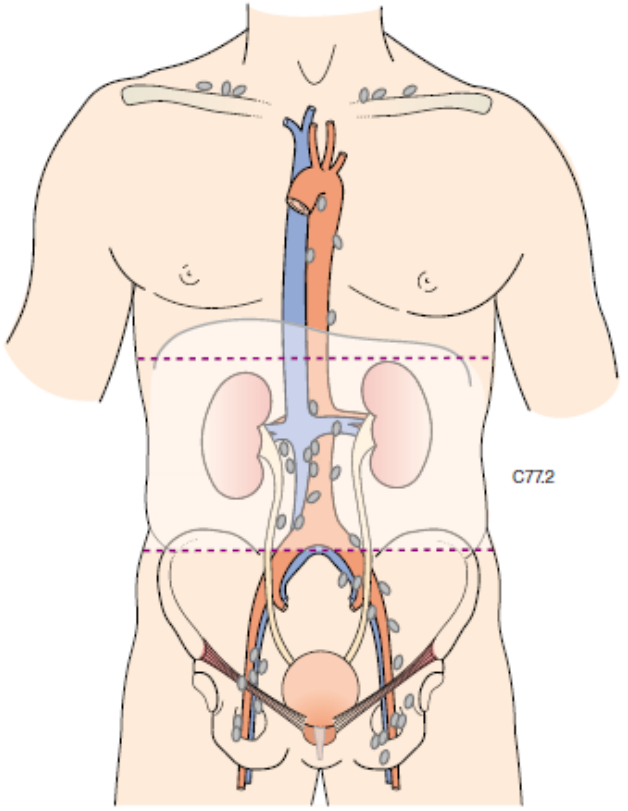
N-category

- **NX** Regional lymph nodes cannot be assessed
  No clinical or pathological investigations have been performed
- **N0** No regional lymph node metastasis
  Regional lymph nodes have been clinically or pathologically proven to be **free of metastatic disease**
- **N1-N2-N3** Increasing involvement of regional lymph nodes by **number**, **location** or **size**

N-category values: presence or absence (only)

- Example: **Kidney**
  - **N0** no regional lymph nodes
  - **N1** metastasis in regional lymph node(s)

The regional lymph nodes are the hilar, abdominal para-aortic, and paracaval nodes. Laterality does not affect the N categories.



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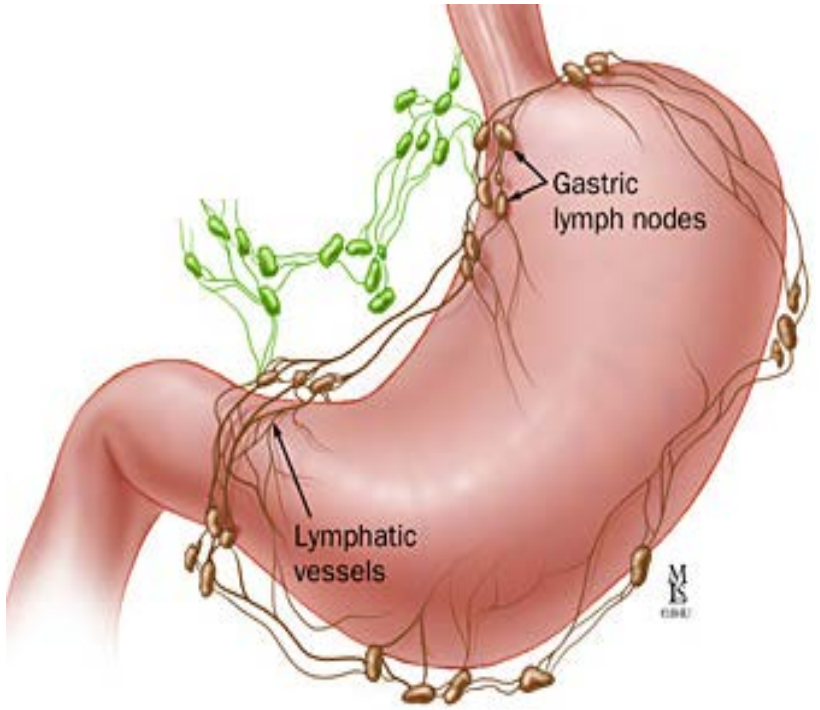
N- category values: number

- Example: **Stomach**
  - **N1** 1-2 regional nodes involved
  - **N2** 3-6 regional nodes involved
  - **N3** 7 or more node involved



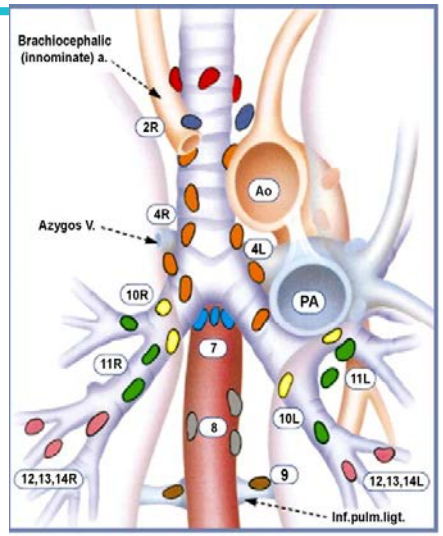
N-category values: Location

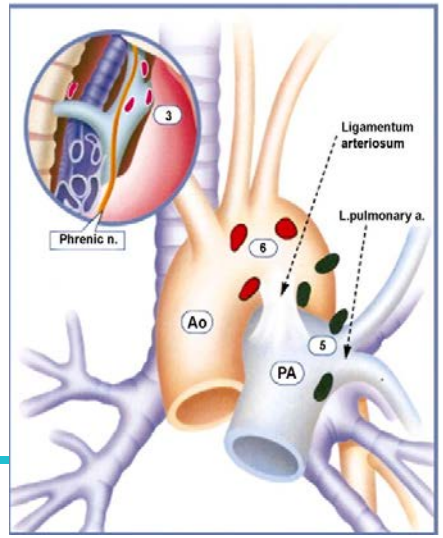
- Example: **Lung**

N1 ipsilateral peribronchial and/or hilar and intrapulmonary nodes

N2 ipsilateral mediastinal and/or subcarinal nodes

N3 contralateral mediastinal, hilar, scalene or supraclavicular nodes





Superior Mediastinal Nodes

- 1 Highest Mediastinal
- 2 Upper Paratracheal
- 3 Pre-vascular and Retrotracheal
- 4 Lower Paratracheal (including Azygos Nodes)

N_2=single digit, ipsilateral
N_3=single digit, contralateral or supraclavicular

Aortic Nodes

- 5 Subaortic (A-P window)
- 6 Para-aortic (ascending aorta or phrenic

Inferior Mediastinal Nodes

- 7 Subcarinal
- 8 Paraesophageal (below carina)
- 9 Pulmonary Ligament

N_1 Nodes

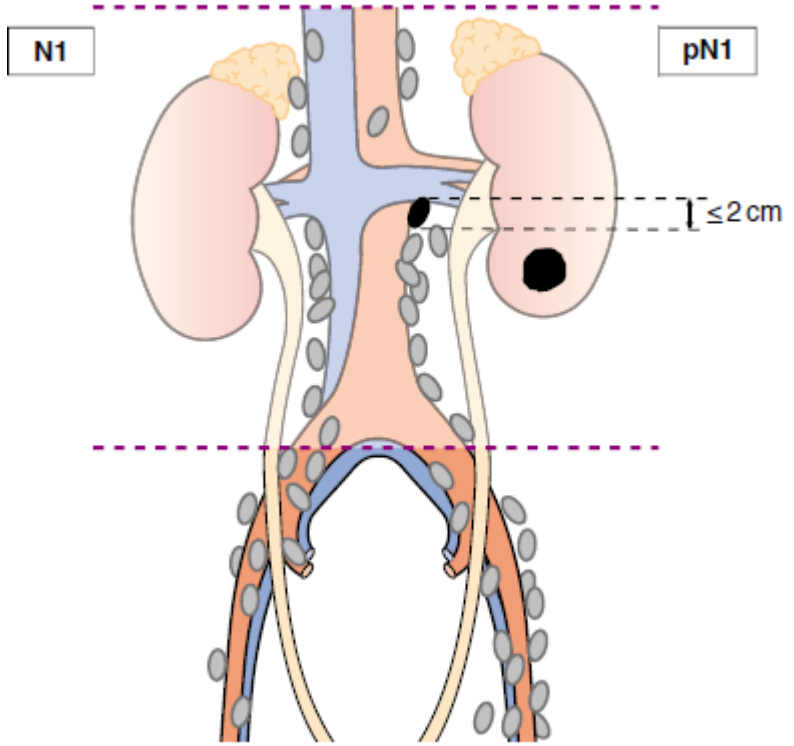
- 10 Hilar
- 11 Interlobar
- 12 Lobar
- 13 Segmental
- 14 Subsegmental

N-category values: size and number

- Example: **Renal pelvis and ureter**

  N1 single node, 2 cm or less

  N2 single node >2 cm or multiple nodes



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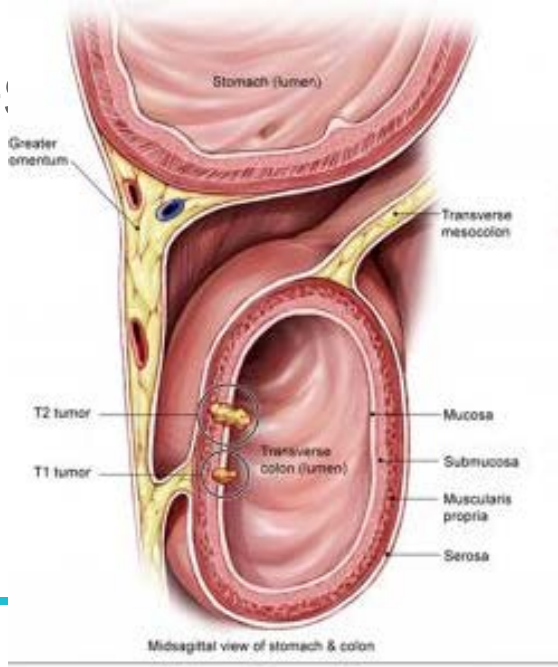
The General Rules of the TNM system: pN

- Pathological assessment of lymph nodes ideally requires -but is not limited to- the resection of a minimum number of nodes.
  - Is tumour site specific
    - Breast: 6 or more; Colorectal: 12 or more; Larynx: 10 or more (selective neck dissection)
  - If less than the expected number resected, the N category is still assigned by the same criteria as if the expected number of nodes where assessed
- Examination of a single node without pathological examination of the primary is considered a biopsy and should be classified as ‘clinical’=>cN.
- It is *not* necessary to pathologically confirm the status of the highest N category to assign the pN (8th edition!)

The General Rules of the TNM system: example pN

- A 49 year old man undergoes a sigmoid colectomy for a cancer
- The tumour invades into the muscularis propria (T2)
- None out of 9 identified lymph nodes contain metastase
  12 is the number of nodes ordinarily to be included
  - pT2 pN0 (not NX although only 9 nodes resected)
  - Best annotation: pT2 pN0 (0/9)



Primary Tumor (*T*)
T1 or T2

N-category: cN and pN

- Most pN categories correspond to the cN categories
  - Exceptions (= different cN and pN categories)
    - Head and neck tumours
    - Skin carcinoma of the head and neck
    - Breast cancer
    - Merkel cell carcinoma
    - Penis
    - Testis

N-category: oral cavity cN and pN definitions

N – Regional Lymph Nodes

- NX Regional lymph nodes cannot be assessed
- N0 No regional lymph node metastasis
- N1 Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension without extranodal extension
- N2 Metastasis described as:
  - N2a Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension without extranodal extension
  - N2b Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension, without extranodal extension
  - N2c Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension, without extranodal extension
- N3a Metastasis in a lymph node more than 6 cm in greatest dimension without extranodal extension
- N3b Metastasis in a single or multiple lymph nodes with clinical extranodal extension*

Notes

* The presence of skin involvement or soft tissue invasion with deep fixation/tethering to underlying muscle or adjacent structures or clinical signs of nerve involvement is classified as clinical extranodal extension.

Midline nodes are considered ipsilateral nodes.

pN – Regional Lymph Nodes

- pNX Regional lymph nodes cannot be assessed
- pN0 No regional lymph node metastasis
- pN1 Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension without extranodal extension
- pN2 Metastasis described as:
  - pN2a Metastasis in a single ipsilateral lymph node, less than 3 cm in greatest dimension with extranodal extension or, more than 3 cm but not more than 6 cm in greatest dimension without extranodal extension
  - pN2b Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension, without extranodal extension
  - pN2c Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension, without extranodal extension
- pN3a Metastasis in a lymph node more than 6 cm in greatest dimension without extranodal extension
- pN3b Metastasis in a lymph node more than 3 cm in greatest dimension with extranodal extension or, multiple ipsilateral, or any contralateral or bilateral node(s) with extranodal extension

Histological examination of a selective neck dissection specimen will ordinarily include 10 or more lymph nodes. Histological examination of a radical or modified radical neck dissection specimen will ordinarily include 15 or more lymph nodes.

The General Rules of the TNM System: sentinel node

Sentinel node

- The sentinel lymph node is the first lymph node to receive lymphatic drainage from a primary tumour.
  - it can be detected by a variety of techniques
  - can be biopsied
- If it contains metastatic tumour => other lymph nodes may contain tumour a node dissection may be warranted.
- If it does not contain metastatic tumour => other lymph nodes not likely to contain tumour, then a lymph node dissection is not necessary.

The General Rules of the TNM System

Sentinel node

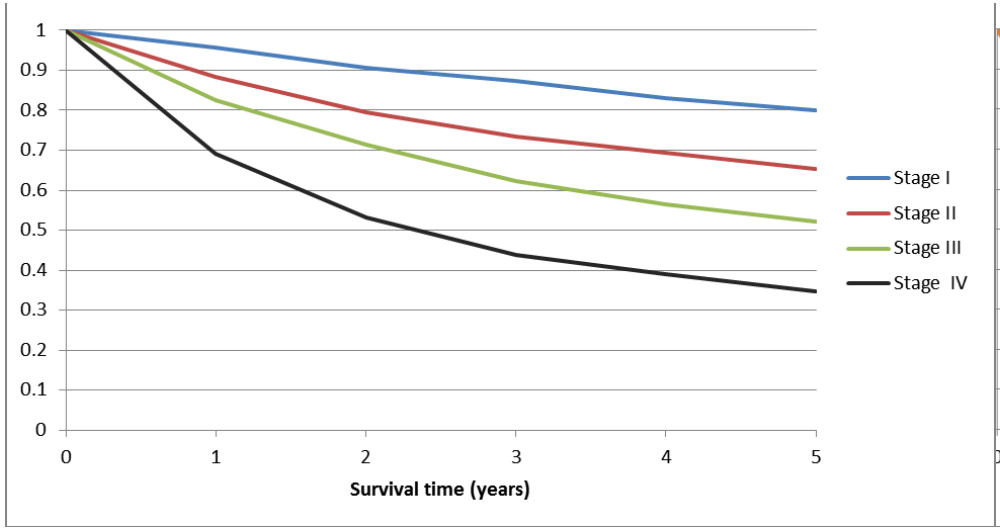
NX (sn)	Sentinel lymph node could not be assessed
N0 (sn)	No sentinel lymph node metastasis
N1 (sn)	Sentinel lymph node metastasis

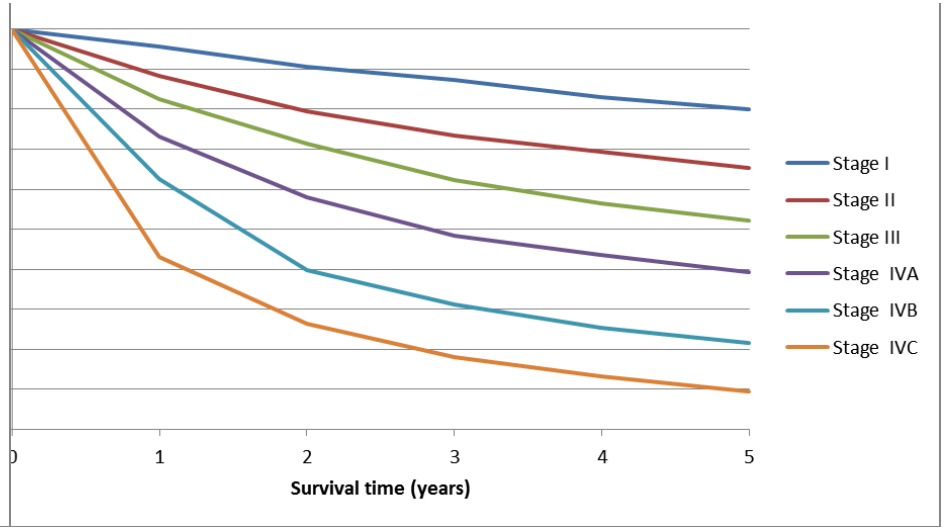
Excisional biopsy of a sentinel node, in the absence of assignment of a pT, is classified as a clinical N,

e. g. cN1(sn)

pN is used for sentinel node biopsy only in conjunction with a pathological T assignment

Head and neck cancer 2009-2013, 5 year rel survival, Belgium





	T	N	M
Stage IV A	1,2,3	2	0
Stage IV A	4a	0,1,2	0
Stage IV B	4b	Any	0
Stage IV B	Any	3	0
Stage IV C	Any T	Any N	1

TNM, 7th edition

The General Rules of the TNM system: cM category

- **cM0** No distant metastasis
- **cM1** Distant metastasis

  M1 subcategories (rare)

  - example: prostate
    - M1a non-regional lymph nodes
    - M1b bone(s)
    - M1c other site(s)

    In case of multiple metastatic sites: most advanced category is used. Highest value: M1c

- Note: the **cMX category is considered to be inappropriate** as clinical assessment of metastasis can be based on physical examination alone.

  General examination is enough: *assume cM0* unless there is definite evidence of metastatic disease

The General Rules of the TNM system: pM category

- **pM1** Distant metastasis microscopically confirmed
- Note: pM0 and pMX are NOT valid categories.

The General Rules of the TNM system: pM example

- A 49 year old man undergoes a sigmoid colectomy for a colon cancer and a concurrent wedge resection of a solitary liver metastasis
- The tumour invades into the muscularis propria (T2)
- None out of 9 identified nodes contains metastases (12 is the number of nodes ordinarily identified)
- The stage is pT2pN0(0/9) pM1

The General Rules of the TNM system: Use of X

X

is used only when either the T category or the N category can not be assessed

example:
a thyroid cancer when there are no nodes identified in a thyroidectomy specimen: pNX is appropriate

The General Rules of the TNM System: Use of X

X

- Should be used as little as possible
  - Because (frequently) no assignment of a stage group will be possible...
  - Except when distant metastases (c/pM1) are present

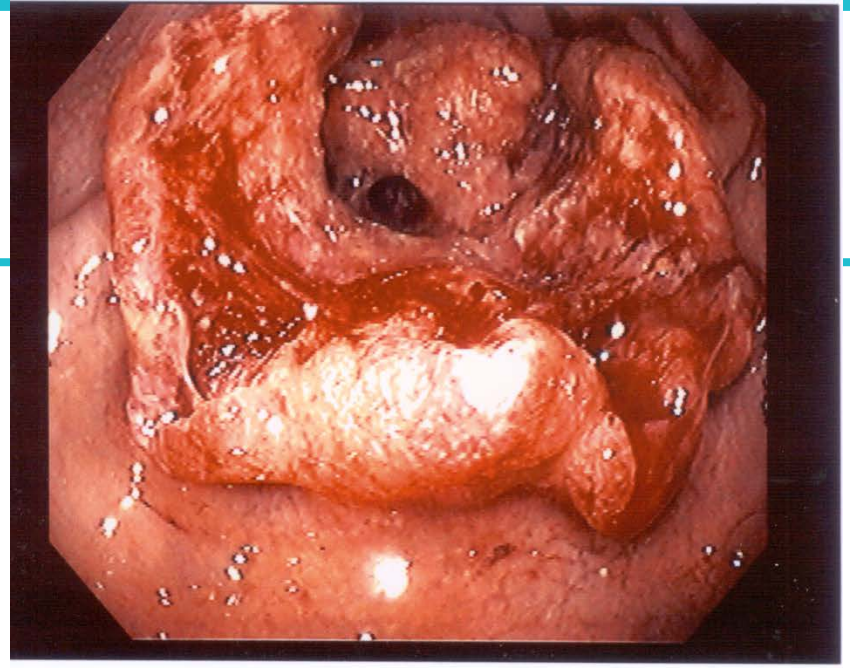
- Do not use X when in doubt about T or N or M: chose the lower, i.e. less advanced category

The General Rules of the TNM System: ycTNM - ypTNM

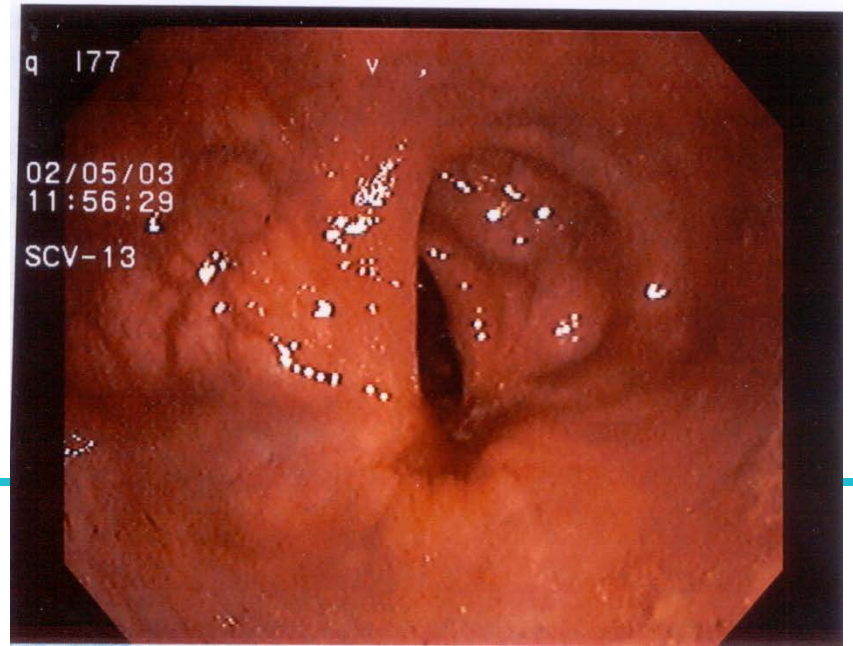
y Symbol - Classifying Treated Tumours

The ypTNM classification deals with the pathological evaluation of the extent of cancer after neoadjuvant therapy. Therefore, the ypTNM should consider only viable tumour cells and not signs of regressed tumour tissue such as necrotic cell, mucin, debris, scars, etc.

Example



6 month history rectal bleeding and narrow stool
Colonoscopy 4cm long tumour
biopsy adenocarcinoma
MRI performed - cT3N1



Neo-adjuvant chemoradiation
Clinical complete response on Examination and MRI
ycT0N0M0

Surgery: Anterior resection.
Pathology: No residual tumour. Mucin in 3 nodes.
ypT0N0

The General Rules of the TNM System: optional descriptors

Additional descriptors

V venous invasion

L lymphatic invasion

Pn perineural invasion

- L – Lymphatic invasion
  - LX: lymphatic invasion cannot be assessed
  - L0: no lymphatic invasion
  - L1: lymphatic invasion
- V – Venous invasion
  - VX: venous invasion cannot be assessed
  - V0: no venous invasion
  - V1: venous invasion
- Pn – Perineural invasion
  - PX: perineural invasion cannot be assessed
  - P0: no perineural invasion
  - P1: perineural invasion

The General Rules of the TNM System: ITC

Isolated tumour cell - ITC

ITC may be found in lymph nodes or in metastatic sites including the bone marrow and non regional nodes

- Single tumor cell or Small clusters of cells not more than 0.2mm in size
- Small clusters of cells comprising fewer than 20 cells in a single cross section (Can be up to 200 in breast)

If found by immunohistochemical techniques or morphological techniques in all tumour sites (except Melanoma and Merkel cell ca) the **N-category 0 is applied**

The General Rules of the TNM System: prefix ‘a’, ‘r’

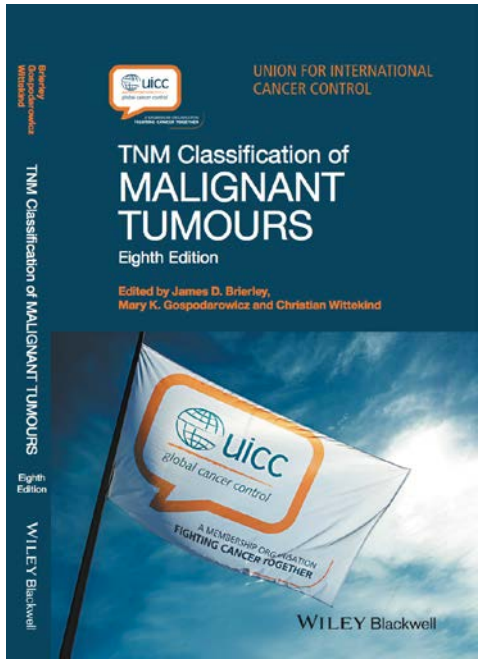
Additional descriptors

c and p: most common descriptors of TNM
y: increasingly used (rectum, oesophagus, breast, …)

a descriptor
aTNM – stage determined at autopsy

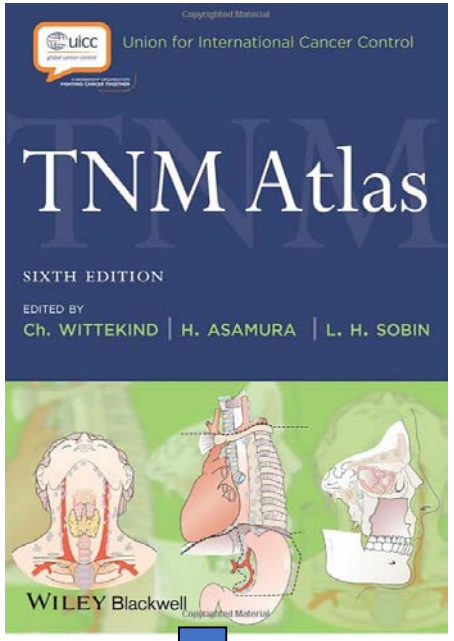
r descriptor
(rTNM – stage determined after initial treatment at recurrence, or after surveillance => very little evidence in literature, not as such recommended)

http://www.uicc.org/resources/tnm/publications-resources

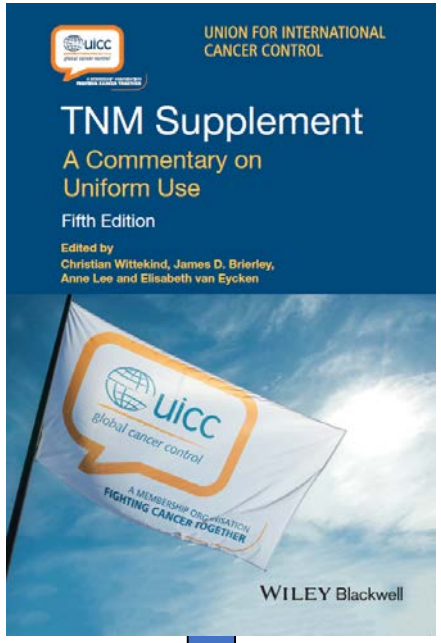


TNM HELP DESK

Learn more about TNM activities and resources.



Upcoming new edition related to the 8th edition TNM, early 2020



NEW: 5th edition related to the 8th edition TNM classification,

UICC TNM E-LEARNING MODULES

https://www.uicc.org/resources/tnm

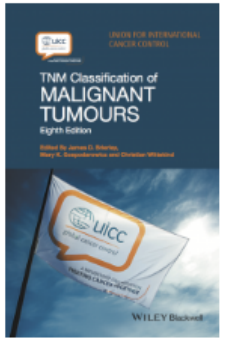
Search...

Who we are | What we do | Who we work with | Resources

TNM

- TNM Classification of Malignant Tumours
- Cancer Atlas
- UICC Journals
- IARC Cancer Today

What is TNM?



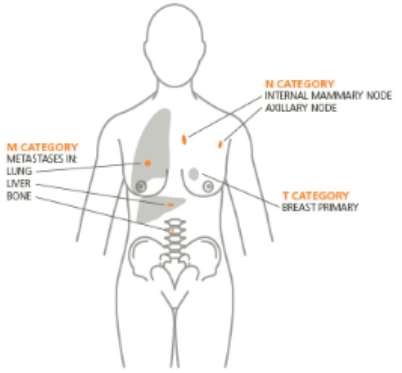
The classification of cancer by anatomic disease extent, i.e. stage, is the major determinant of appropriate treatment and prognosis. Stage is an increasingly important component of cancer surveillance and cancer control and an endpoint for the evaluation of the population-based screening and early detection efforts.

The UICC has published the UICC TNM classification of malignant tumours for over 50 years. The UICC TNM classification is the internationally accepted standard for cancer staging.

The UICC TNM Classification is an anatomically based system that records the primary and regional nodal extent of the tumor and the absence or presence of metastases.

Each individual aspect of TNM is termed as a category:

- T category describes the primary tumor site
- N category describes the regional lymph node involvement
- M category describes the presence or otherwise of distant metastatic spread



Why adopt the TNM Classification?

The UICC TNM staging system is the common language in which oncology health professionals can communicate on the cancer extent for individual patients as a basis for decision making on treatment management and individual prognosis but can also be used, to inform and evaluate treatment guidelines, national cancer planning and research.

https://www.uicc.org/resources/tnm

TNM Classification of Malignant Tumours

- Global Advisory Group
- Groups and panel
- Publications and Resources
- E-learning
- Helpdesk

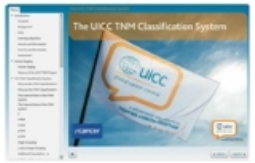
Cancer Atlas

UICC Journals

IARC Cancer Today

E-learning

UICC TNM E-Learning Modules



eCancer and UICC jointly produced a set of 7 modules on TNM staging for the purpose of educating and informing the global cancer community on the globally accepted classification of malignant tumours.

The following modules are now available to download:

- Module 1: Introduction to the UICC TNM Classification System
- Module 2: UICC TNM Breast Cancer Classification
- Module 3: UICC TNM Prostate Cancer Classification
- Module 4: UICC TNM Colorectal Cancer Classification
- Module 5: UICC TNM Cervix Cancer Classification
- Module 6: UICC TNM Lip and Oral Cavity Cancer Classification
- Module 7: UICC TNM Lung Cancer Classification

In French: TNM e-Modules en français

- Module: l'introduction à la classification TNM
- Module: Le système de classification TNM de l'UICC

Each module takes approximately 30 minutes to complete and includes a voice-over and interactive quiz.

By the end of each module, users should:

- know the general principles of the UICC TNM Classification of Malignant Tumours,
- understand the structure of the UICC TNM Classification 8th edition and
- be able to apply the UICC TNM Classification to different cancer sites

Learn more about eCancer.

Short educational videos: Cancer Staging Series

Watch this short video series produced in collaboration with Princess Margaret Cancer Centre to learn what cancer staging is, its importance for patients, research and cancer control, and the terminology used in

1. Importance of Cancer Staging
2. What is Cancer Stage
3. General Rules for Cancer Staging
4. Cancer Staging Examples
5. Staging Terminology
6. Importance of Common Stage Language
7. Why stage language changes and how this affects usage
8. Essential TNM

TNM Help desk

TNM Classification of Malignant Tumours
- Global Advisory Group
- Groups and panel
- Publications and Resources
- E-learning
- Helpdesk

Cancer Atlas

UICC Journals

IARC Cancer Today

Please download the FAQ's page for answers to your questions on cancer staging. If you do not find the answer to your question, complete the form and send it to the TNM help desk. Please fill in all fields.

I am a *
– Select –

Title *
Dr

First name *

Last name *

Organization *

Country *
- Select -

Email *

My TNM question *

Acceptance of use of data and our privacy policy

- Exercises general principles

https://create.kahoot.it/share/general-exercises/e1e462ac-009e-4865-ab53-af44c198468c

Coding stage:

Toronto Paediatric Cancer Stage Guidelines

Liesbet Van Eycken

Paediatric tumours: Stage

- Adult cancers
  - Main method of staging = TNM classification (UICC/AJCC)

- Childhood cancers
  - Heterogeneous, rare
  - TNM not applicable for most paediatric cancers
  - Mostly staged by disease-specific staging systems
    - Different systems for the same disease
    - Differences between countries

- Need for consistency in collection of staging data
  → Facilitate international comparisons and studies

Toronto consensus meeting

- October 2014 in Toronto, Canada
- 26 international experts (from 17 countries, 6 continents)
  - Variety in expert fields, geography, resource settings
- Tiered staging system with adaptations for low-income countries (fewer resources, limited/no advanced imaging)
  - Tier 1: for registries with limited resources
  - Tier 2: for well-resourced cancer registries
  - Tier 3: optional additional prognostic factors
- Recommendations for staging systems to be used by cancer registries for 18 major childhood malignancies

Toronto consensus principles and guidelines

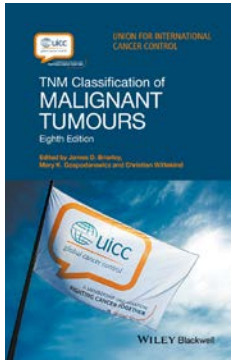
- Published in: Lancet Oncol 2016;17: 163–72

Paediatric cancer stage in population-based cancer registries: the Toronto consensus principles and guidelines

Sumit Gupta, Joanne F Aitken, Ute Bartels, James Brierley, Mae Dolendo, Paola Friedrich, Soad Fuentes-Alabi, Claudia P Garrido, Gemma Gatta, Mary Gospodarowicz, Thomas Gross, Scott C Howard, Elizabeth Molyneux, Florencia Moreno, Jason D Pole, Kathy Pritchard-Jones, Oscar Ramirez, Lynn A G Ries, Carlos Rodriguez-Galindo, Hee Young Shin, Eva Steliarova-Foucher, Lillian Sung, Eddy Supriyadi, Rajaraman Swaminathan, Julie Torode, Tushar Vora, Tezer Kutluk, A Lindsay Frazier

- Endorsed by the UICC and included in the TNM 8th edition

- 2nd Consensus meeting, Lyon, 21st of October 2019



Content Paediatric Tumours (TNM 8th edition UICC)

- Gastro-intestinal Tumours
  - Hepatoblastoma: Tier 1 and 2
- Bone and Soft Tissue Tumours
  - Osteosarcoma Tier 1 and 2
  - Ewing Sarcoma Tier 1 and 2
  - Rhabdomyosarcoma Tier 1 and Tier 2 (modified TNM)
  - Soft Tissue Sarcoma other than Rhabdomyosarcoma: Tier 1 and 2 (TNM)
- Gynaecologic Tumours: Ovary Tier 1 and Tier 2 (TNM-FIGO)
- Urological Tumours
  - Wilms Tumour Tier 1 and Tier 2 (2 Tier 2 systems: 1 after surgical resection prior to chemo, SIOP if preop chemo)
- Ophtalmic Tumours
  - Retinoblastoma Tier 1 and Tier 2 (determined after enucleation = pathologic classification)/ IRSS (Internat. Class for Intraocular RB)
- Malignant Lymphoma
  - Hodgkin Lymphoma
  - Non Hodgkin Lymphoma Tier 1 and Tier 2 St Jude/Murphy system
- Central Nervous System
  - Medulloblastoma and Ependymoma Tier 1 and Tier 2
  - Neuroblastoma Tier 1 and Tier 2 (International Neuroblastoma Risk Group Staging System (INRGSS)

Paediatric tumours: Hepatoblastoma

- **Tier 1 and 2**
  - Metastatic: distant metastasis present
  - Localised: Tumour confined to the liver including regional lymph nodes

  - Paediatric Oncology: ‘Pretext classification’
    (will probably move from tier 3 => tier 2)

Paediatric cancer: Rhabdomyosarcoma

Tier 1

Metastatic	Distant metastases present
Localized	Tumour confined to the area of origin including regional lymph nodes

Prognostic Grouping

The prognostic grouping for rhabdomyosarcoma includes favourable anatomic sites and unfavourable anatomic sites.

Favourable anatomic sites: Orbit, head and neck(excluding parameningeal tumours) and genitourinary sites (excluding bladder and prostate tumours)

Unfavourable anatomic sites: Bladder, prostate, extremity, cranial, parameningeal, trunk, retroperitoneum and all other sites not noted as favourable

Stage I	Any T	Any N	M0	Favourable Site
Stage II	T1a, T2a	N0	M0	Unfavourable Site
Stage III	T1a, T2a	N1	M0	Unfavourable Site
	T1b, T2b	Any N	M0	Unfavourable Site
Stage IV	Any T	Any N	M1	Any Site

Tier 2

A modified TNM Clinical Classification with the addition of favourable or non-favourable tumour site.

T – Primary Tumour*

TX	Primary tumour cannot be assessed
T0	No evidence of primary tumour
T1	Confined to a single anatomic site
T1a	Tumour 5 cm or less in greatest dimension
T1b	Tumour more than 5 cm in greatest dimension
T2	Extension beyond anatomic site
T2a	Tumour 5 cm or less in greatest dimension
T2b	Tumour more than 5 cm in greatest dimension

N – Regional Lymph Nodes

NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis

	Tier 1 staging system	Tier 2 staging system
ALL	CNS neg/ pos	CNS 1/ 2/ 3
AML	CNS neg/ pos	CNS neg/ pos
CML	(none)	(none)
Hodgkin's lymphoma	Ann Arbor stage I/ II/ III/ IV A/ B	Ann Arbor stage I/ II/ III/ IV A/ B
Non-Hodgkin lymphoma	Limited/Advanced	St Jude/Murphy stage I/ II/ III/ IV
Neuroblastoma	Localised/ Locoregional/ Metastatic/ INRGSS - MS disease	INRGSS - Localised L1/ Locoregional L2/ Metastatic M/ MS disease
Wilms' tumour	Localised/ Metastatic	NWTSG or SIOP stage I/ II/ III/ IV
Rhabdomyosarcoma	Localised/ Metastatic	TNM stage I/ II/ III/ IV
Non-rhabdomyosarcoma soft-tissue sarcomas	Localised/ Metastatic	TNM stage I/ II/ III/ IV
Osteosarcoma	Localised/ Metastatic	Localised/ Metastatic
Ewing's sarcoma	Localised/ Metastatic	Localised/ Metastatic
Retinoblastoma	Localised (intraocular) / Regional (orbital or regional lymph nodes) / Distant (extra-orbital)	IRSS stage 0/ I/ II/ III/ IV
Hepatoblastoma	Localised/ Metastatic	Localised/ Metastatic
Testicular	Localised/ Regional/ Metastatic	TNM stage I/ II/ III
Ovarian	Localised/ Regional/ Metastatic	FIGO stage I/ II/ III/ IV
Astrocytomas	(none)	(none)
Medulloblastoma and other CNS embryonal tumours	M0 or localised/ M+ or metastatic	M0/ 1/ 2/ 3/ 4
Ependymoma	M0/ M+	M0/ 1/ 2/ 3/ 4

TNM 8th edition and Paediatric Tumours

- ALL and AML: Stage not published in the TNM booklet

- Neuroblastoma Tier 2 is not specified in the TNM booklet
  - INRGSS: International Neuroblastoma Risk Group Staging System

    Stage L1: Locoregional tumor without Imaging derived risk factors (IDRFs)
    Stage L2: Locoregional tumor with one or more IDRFs
    Stage M: Distant metastatic disease (except Ms)
    Stage Ms: INRG Stage L1 or L2 tumor with metastatic disease confined to skin and/or liver and/or bone marrow

	Tier 1 staging system	Tier 2 staging system	Comments
Acute lymphoblastic leukaemia	CNS negative	CNS 1[28]	Collection of testicular involvement not endorsed given rarity and uncertain prognostic value in first presentation disease; white blood cell count at presentation was not considered reflective of stage
	CNS positive	CNS 2	
	CNS positive	CNS 3	
Acute myeloid leukaemia	CNS negative	CNS negative[29]	..
	CNS positive	CNS positive	
Chronic myeloid leukaemia	None	None	No relevant staging system identified or necessary
Hodgkin's lymphoma	Ann Arbor—stage IA/B[30] Ann Arbor—stage IIA/B Ann Arbor—stage IIIA/B Ann Arbor—stage IVA/B	Ann Arbor—stage IA/B[30] Ann Arbor—stage IIA/B Ann Arbor—stage IIIA/B Ann Arbor—stage IVA/B	Used in both adult and paediatric populations; recent proposals in adult populations to move to more simplified limited *vs* advanced staging classifications[31] not yet evaluated in paediatric populations; multi-tiered staging systems deemed not appropriate
Non-Hodgkin lymphoma	Limited	St Jude/Murphy—stage I[32]	Tier 1 advanced stage indicates CNS or bone marrow involvement; although some clinicians will use Ann Arbor staging for non-Hodgkin lymphoma, St Jude/Murphy more often used in paediatric populations; Ann Arbor stage IV will often correspond to Tier 1 advanced stage disease; whether Ann Arbor or St Jude/Murphy staging systems were used by clinicians can be difficult to ascertain from medical charts
	Limited	St Jude/Murphy—stage II	
	Limited	St Jude/Murphy—stage III	
	Advanced	St Jude/Murphy—stage IV	
Neuroblastoma	Localised	INRGSS—localised L1[33]	MS disease refers to children younger than 18 months with metastases confined to skin, liver, or bone marrow; the first two stages of the Tier 1 system are intended to be simplified proxies of INRGSS L1 and L2 not dependent on adequate assessment of imaging-defined risk factors
	Locoregional	INRGSS—locoregional L2	
	Metastatic	INRGSS—metastatic M	
	INRGSS—MS disease	INRGSS—MS disease	

	Tier 1 staging system	Tier 2 staging system	Comments
Wilms' tumour	Localised	Stage I[35]/y-stage I[35]	y designates that staging assessment was performed after neoadjuvant therapy was given, which allows the staging system to accommodate both SIOP and COG/NWTSG-based treatment strategies;[15] in cases of bilateral disease the stage of the most advanced kidney should be recorded
	Localised	Stage II/y-stage II	
	Localised	Stage III/y-stage III	
	Metastatic	Stage IV	
Rhabdomyosarcoma	Localised	TNM stage 1[27]	Rhabdomyosarcoma overall stage incorporates both TNM staging and site of disease; as registries collect primary disease site, overall rhabdomyosarcoma stage may be approximated with either tier staging system; for very high-resourced registries, a Tier 3 system that incorporates site of metastases could be considered
	Localised	TNM stage 2	
	Localised	TNM stage 3	
	Metastatic	TNM stage 4	
Non-rhabdomyosarcoma soft-tissue sarcomas	Localised	TNM stage 1[27]	..
	Localised	TNM stage 2	
	Localised	TNM stage 3	
	Metastatic	TNM stage 4	
Osteosarcoma	Localised	Localised	Although more detailed staging systems exist,[34] their clinical and prognostic value is limited; multi-tiered staging systems were not deemed appropriate; for very high-resourced registries, a Tier 3 system which incorporates site of metastases could be considered
	Metastatic	Metastatic	
Ewing's sarcoma	Localised	Localised	Although more detailed staging systems exist,[34] their clinical and prognostic value is limited; multi-tiered staging systems were not deemed appropriate; for very highly resourced registries, a Tier 3 system incorporating site of metastases may be considered
	Metastatic	Metastatic	

	Tier 1 staging system	Tier 2 staging system	Comments
Retinoblastoma	Localised (intraocular)	IRSS stage 0[35]	In keeping with current registry guidelines for retinoblastoma, in cases of bilateral disease the stage of the most advanced eye should be recorded; within IRSS stage 0, group A–E was considered Tier 3 recommendation
	Localised (intraocular)	IRSS stage I	
	Localised (intraocular)	IRSS stage II	
	Regional (orbital or regional lymph nodes)	IRSS stage III	
	Distant (extra-orbital)	IRSS stage IV	
Hepatoblastoma	Localised	Localised	Collection of PRETEXT is a Tier 3 option[36]
	Metastatic	Metastatic	
Testicular	Localised	TNM stage I[37]	Although the Tier 1 and Tier 2 staging systems correlate perfectly, the individual components of TNM staging would not be collected in the Tier 1 system
	Regional	TNM stage II	
	Metastatic	TNM stage III	
Ovarian	Localised	FIGO stage I[38]	..
	Regional	FIGO stage II	
	Regional	FIGO stage III	
	Metastatic	FIGO stage IV	

	Tier 1 staging system	Tier 2 staging system	Comments
Astrocytomas	None	None	No relevant staging system identified or necessary
Medulloblastoma and other CNS embryonal tumours	M0 or localised	M0[11]	Residual disease, defined as >1·5 cm^2 after resection, is an important non-stage prognostic factor and could be considered for collection by appropriately resourced registries[39,40]
	M+ or metastatic	M1	
	M+ or metastatic	M2	
	M+ or metastatic	M3	
	M+ or metastatic	M4	
Ependymoma	M0	M0	Extent of resection, defined as no resection *vs* subtotal *vs* gross total, is an important non-stage prognostic factor and might be considered for collection by appropriately resourced registries
	M+	M1	
	M+	M2	
	M+	M3	
	M+	M4	

Tiered staging systems for the main childhood cancers. AJCC=American Joint Committee on Cancer. COG=Children's Oncology Group. FIGO=International Federation of Gynaecological Oncologists. INRGSS=International Neuroblastoma Risk Group Staging System. IRSS=International Retinoblastoma Staging System. NWTSG=National Wilms Tumour Study Group. SIOP=International Society of Paediatric Oncology.

Table 3: **The Toronto Paediatric Cancer Stage guidelines**

- Exercises

- https://create.kahoot.it/share/childhood-cancer-exercises/56a220f7-8ddc-4c91-a55d-fa7e8bacdfac

Conclusions

- Recording stage in a cancer registry
  - Offers specific information for Public Health/ surveillance and oncology objectives
  - Needs validation and consistency checks
  - Invites to work on ‘comparability’
  - But also has to tackle difficulties... complexity, missing data, diagnostic precision differences, versions and updates...

TNM : a fascinating but never ending story…..

The General Rules of the TNM System: ITC

Isolated tumour cell - ITC

ITC may be found in lymph nodes or in metastatic sites including the bone marrow and non regional nodes

- Single tumor cell or Small clusters of cells not more than 0.2mm in size
- Small clusters of cells comprising fewer than 20 cells in a single cross section (Can be up to 200 in breast)

If found by immunohistochemical techniques or morphological techniques in all tumour sites (except Melanoma and Merkel cell ca) the **N-category 0 is applied**

The General Rules of the TNM System: prefix ‘a’, ‘r’

Additional descriptors

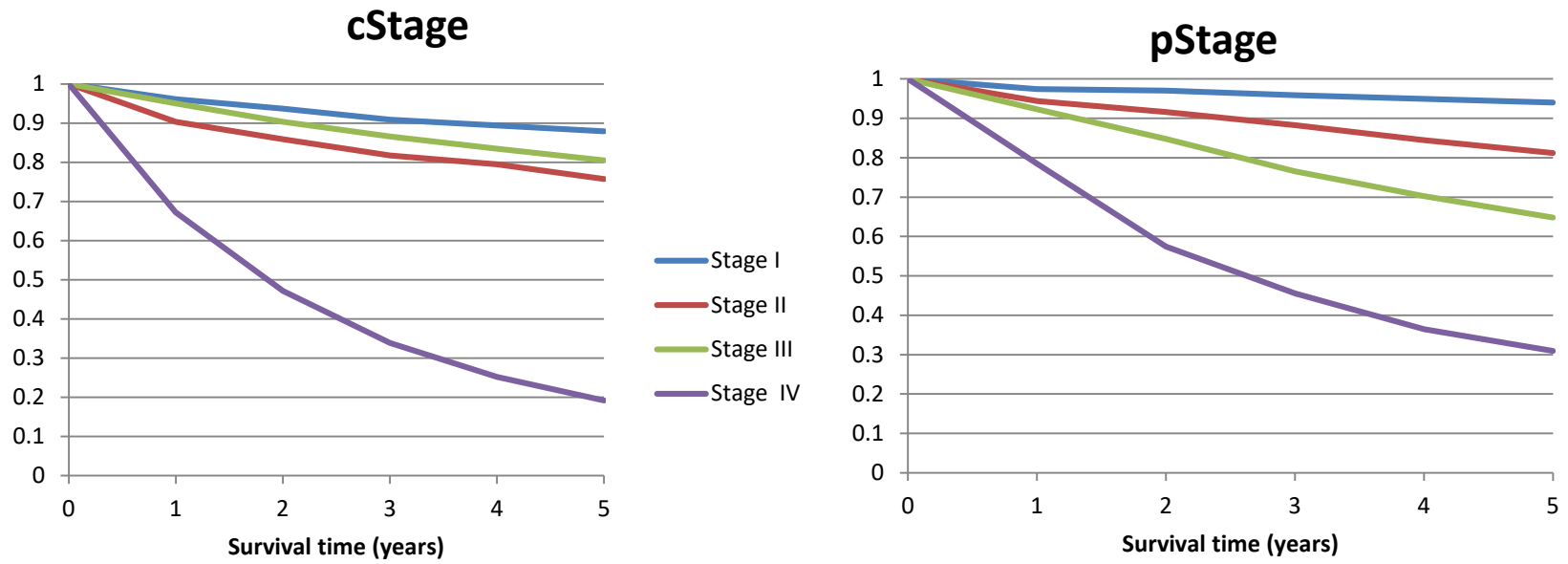
Although c, p and increasingly frequently y are the commonest descriptors of TNM, others may be used.

aTNM – stage determined at autopsy
rTNM – stage determined after initial treatment at recurrence, or after surveillance

The Objectives of Staging

- To aid in the planning of treatment
- To give some indication of prognosis
- To assist in evaluation of the results of treatment
- To facilitate the exchange of information and aid research
- To contribute to research
- **To support cancer control activities – added in 7th edition**

Rectal cancer: c Stage and p Stage



Example: c- and p-Stage for Rectal cancer
5-year relative survival, 2009-2013, Belgium

The General Rules of the TNM System: cTNM

- The accuracy of the cTNM depends on...
  - the use/availability/sensitivity/extent of staging procedures used

- It is not necessary to assess the whole body by imaging before you can assign a cM

- General examination is enough: *assume cM0* unless there is definite evidence of metastatic disease